REMARKS/ARGUMENTS

The Office Action dated June 13, 2006, has been reviewed in detail and it is noted that Claims 1, 3, 5-11 and 17-25 are pending in the application. Claims 2, 4, and 12-16 have been previously canceled. Other than the correction of a minor grammatical error in claims 1 and 17, no other claims have been amended herein.

Applicant retains the right to pursue broader claims via a continuing application under 35 U.S.C. § 120.

Terminal Disclaimer

In the outstanding Office Action the Examiner stated that:

"The terminal disclaimer filed on 5/19/2006 does not comply with 37 CFR 1.321(b) and/or (c) because: only 77% interest. A 100% interest is needed."

In response thereto, a new terminal disclaimer has been submitted herewith on behalf of all of the owners, such that the new terminal disclaimer appropriately references a 100% interest. It is believed that this terminal disclaimer now complies with 37 CFR 1.321(b).

Double Patenting:

In the outstanding Office Action, Claims 1, 3, 5-11 and 17-25 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting. Specifically, the Examiner stated:

"Claims 1,3,5-11, & 17-25 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-5 & 11-16 of copending Application No. 10/342,660 "copending '660". Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reason(s).

"The major difference between the claimed catalyst and the catalyst of the copending '660, is that the catalyst of the copending '660 includes an additional "ruthenium" metal component, as a reducing species.

"It would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made to have added such known ruthenium metal component to the instant catalyst in order to make an improved and effective catalyst because "ruthenium" is know as useful catalytically active catalyst component.

"This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented."

Without addressing the merits of the Examiner's double patenting rejection, the Applicants have submitted herewith a Terminal Disclaimer to Obviate a Provisional Double Patenting Rejection in compliance with 37 C.F.R. § 1.321. The Applicants have also enclosed a Statement executed by the attorney of record attesting that the co-pending application No. 10/342,660, and the instant application, claim inventions which were made as a result of activities undertaken within the scope of a joint research agreement. An earlier terminal disclaimer (and accompanying statement) had been submitted in this case, but not accepted by the Examiner for the reasons set forth immediately above, under the heading "Terminal Disclaimer." However, the current terminal disclaimer has been revised in a manner believed to comply with 37 C.F.R. §1.321. Accordingly, the Applicants respectfully request the Examiner to reconsider and withdraw the double patenting rejection in light of the accompanying Terminal Disclaimer.

Claims Rejections - 35 USC § 102(b)

In the outstanding Office Action the Examiner rejected claim 1, 3, 5-11 and 17-25 under 35 U.S.C. §102(b) as being anticipated by the Maier reference. Specifically, the Examiner stated:

"Claims 1, 3, 5-11, & 17-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Maier (US Pat. 6,121,187).

"Maier discloses an amorphous mixed oxides, wherein at least 50% of said mixed oxides consists of one or a mixture of oxides of titanium, silicon, alumina or zirconium, and up to 50% by weight of consists of one or more metal oxides selected from a group of elements including Sn, Hf, La, Ce, etc. and the claimed promoters, i.e., Fe, Co, Ni (see col 14, claims 1&3). The mixed oxides additionally contains up to 5% by weight of at least one of the elements Pt, Rh, Ir, Os, Ru, Re, Ag, Au, Cu, Ni, Pd, Co in highly dispersed form in a metallic or non-metallic state (see col 14, claim 4).

"Regarding claims 1, 3, 5-6, 17-20, the disclosed noble metal and the first, second, and third metal oxides concentrations are falling within the claimed ranges (see above), thus the claims are met.

"With respect to the claimed first, second, and third metal oxide mass ratio, it is inherent that the mass ratio of these metal oxides would be the same as being claimed in view of the same metal concentrations of these metal oxides disclosed above.

"Regarding claims 7-11 & 21-25, the claims are met by the teaching of the reference in view of the teaching that the disclosed catalyst is suitable for used in various reactions including the claimed reactions (see Maier at col. 5, ln 41-67).

"There is no patentable distinction seen between the claimed catalyst and that disclosed by Maier. Thus, the claims are anticipated by the reference."

In response thereto, it is respectfully submitted that the Maier reference does not anticipate the instant invention. A rejection under 35 U.S.C. §102 must disclose the identical invention and contain every element recited in the claim in as complete detail as is contained in the claim and arranged as recited in the claim. MPEP §2131 provides, inter alia:

> " 'A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described in a single prior art reference.' *Verdegall Bros. v. Union Oil Co. Of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)...'The identical invention must be shown in as complete detail as is contained in the...claim.' *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim..."

The Maier reference discloses amorphous, microporous mixed oxide catalysts which are formed by adjusting

> "the polarity of the interior and exterior surfaces of highly porous oxides, and mixed oxides...by copolycondensating alkyloxy- or aryloxysilanes containing non-hydrolyzable R' groups of the type R'-Si(OR)$_3$ with the other components of the sol-gel process for the preparation of the porous oxides. Thus, catalysts with controlled hydrophobicity can be prepared in one process step. The preparation and composition of these materials can be stated briefly as follows:
>
> $$x(RO)_4Si+y(R'Si(OR^1)_3)+z(X)_nM+H_2O\rightarrow(R'-SiO_{1.5})_x(MO_{n/2})_zSiO_2)_y+4xROH+3yR^1OH+nHX$$
>
> where R and R' are suitable alkyl or aryl groups which may be the same or different, R' is the non-hydrolyzable organic group which changes the hydrophilicity of the material, and M is an element of the group consisting of Si, Ti, Al, Mo, Sn, Zn, V, Mn, Fe, Co, Ni, As, Pb, Sb, Bi, Ru, Re, Cr, W, Nb, Hf, La, Ce, Gd, Ga, In, Tl, Ag, Cu, Li, K, Na, Be, Mg, Ca, Sr and Ba and mostly represents the carrier of the catalytic activity....The base material in this example is SiO_2 which may be replaced by Al_2O_3, TiO_2 or ZrO_2,..." (emphasis added, Maier, column 2, lines 39-64.)

Independent Claim 1 of the instant patent application recites:

1. A low-temperature oxidation-reduction catalyst comprising:
a noble metal selected from the group consisting of platinum, palladium, gold, silver and rhodium;
a mixed-metal oxide layer comprising:
a first metal oxide which possesses more than one stable oxidation state consisting of tin oxide;
a second metal oxide consisting of zirconium oxide; and
a third metal oxide selected from the group consisting of cerium oxide, hafnium oxide, lanthanum oxide, and ruthenium oxide;
said first, second and third metal oxide each being an active catalytic component of said mixed-metal oxide layer; and
wherein said first metal oxide, second metal oxide, and third metal oxide have a mass ratio of about 1.0: 0.5: 0.5.

It is respectfully submitted that contrary to the Examiner's assertion, the Maier reference does not anticipate the recited first metal oxide consisting of tin oxide; second metal oxide consisting of zirconium oxide; and a third metal oxide selected from the group consisting of cerium oxide, hafnium oxide, lanthanum oxide, and ruthenium oxide – wherein "said first metal oxide, second metal oxide, and third metal oxide have a mass ratio of about 1.0: 0.5: 0.5."

It is respectfully submitted that the principles set forth in MPEP § 2131.02 apply to the instant case. Section 2131.02 provides, inter alia:

"A GENERIC CHEMICAL FORMULA WILL ANTICIPATE A CLAIMED SPECIES COVERED BY THE FORMULA WHEN THE SPECIES CAN BE "AT ONCE ENVISAGED" FROM THE FORMULA

"When the compound is not specifically named, but instead it is necessary to select portions of teachings within a reference and combine them, e.g., select various substituents from a list of alternatives given for placement at specific sites on a generic chemical formula to arrive at a specific composition, anticipation can only be found if the classes of substituents are sufficiently limited or well delineated. *Ex parte A*, 17 USPQ2d 1716 (Bd. Pat. App. & Inter. 1990). If one of ordinary skill in the art is able to "at once envisage" the specific compound within the generic chemical formula, the compound is anticipated. One of ordinary skill in the art must be able to draw the structural formula or write the name of each of the compounds included in the generic formula before any of the compounds can be "at once envisaged." One may look to the preferred

embodiments to determine which compounds can be anticipated. *In re Petering*, 301 F.2d 676, 133 USPQ 275 (CCPA 1962).

"In *In re Petering*, the prior art disclosed a generic chemical formula "wherein X, Y, Z, P, and R"- represent either hydrogen or alkyl radicals, R a side chain containing an OH group." The court held that this formula, without more, could not anticipate a claim to 7-methyl-9-[d, l"-ribityl]-isoalloxazine because the generic formula encompassed a vast number and perhaps even an infinite number of compounds. However, the reference also disclosed preferred substituents for X, Y, Z, R, and R" as follows: where X, P, and R" are hydrogen, where Y and Z may be hydrogen or methyl, and where R is one of eight specific isoalloxazines. The court determined that this more limited generic class consisted of about 20 compounds. The limited number of compounds covered by the preferred formula in combination with the fact that the number of substituents was low at each site, the ring positions were limited, and there was a large unchanging structural nucleus, resulted in a finding that the reference sufficiently described "each of the various permutations here involved as fully as if he had drawn each structural formula or had written each name." The claimed compound was 1 of these 20 compounds. Therefore, the reference "described" the claimed compound and the reference anticipated the claims..."

It is submitted that when the above cited holdings are applied to the instant case it is clear that the Maier reference does not anticipate the present invention. Claim 1 recites a mixed-metal oxide layer comprising tin-oxide, zirconium oxide and a third metal oxide selected from the group consisting of cerium oxide, hafnium oxide, lanthanum oxide, and ruthenium oxide, wherein the first metal oxide, second metal oxide, and third metal oxide have a mass ratio of about 1.0: 0.5: 0.5. It is respectfully submitted that this mixed-metal layer is not expressly or inherently described by Maier.

In support of this assertion it is respectfully pointed out that the Maier reference states:

> The preparation and composition of these materials can be stated briefly as follows:
> $$x(RO)_4Si+y(R'Si(OR^1)_3)+z(X)_nM+H_2O\rightarrow(R'-SiO_{1.5})_x$$
> $$(MO_{n/2})_zSiO_2)_y+4xROH+3yR^1OH+nHX$$
> where R and R' are suitable alkyl or aryl groups which may be the same or different, R' is the non-hydrolyzable organic group which changes the hydrophilicity of the material, and M is an element of the group consisting of Si, Ti, Al, Mo, Sn, Zn, V, Mn, Fe, Co, Ni, As, Pb, Sb, Bi, Ru, Re, Cr, W, Nb, Hf, La, Ce, Gd, Ga, In, Tl, Ag, Cu, Li, K, Na, Be, Mg, Ca, Sr and Ba and mostly represents the carrier of the catalytic activity....The base material in this example is SiO_2 which may be replaced by Al_2O_3, TiO_2 or ZrO_2,..." (Maier, column 2, lines 39-64, emphasis added)

Additionally,, as referenced by the Examiner, claim 3 of Maier recites:

> "... wherein at least 50% of said mixed oxides consists of one or a mixture of oxides of titanium, silicon, alumina or zirconium, and up to 50% by weight of consists of *one or more* metal oxides in atomic distribution of the group of elements consisting of Mo, Sn, Zn, V, Mn, Fe, Co, Ni, As, Pb, Bi, Ru, Re, Cr, W, Nb, Hf, La, Ce, Gd, Ga, In, Tl, Ag, Cu, Li, K, Na, Be, Mg, Ca, Sr and Ba."

It is submitted that the Maier reference does not anticipate the instant invention because the instant invention is "not specifically named, but instead it is necessary to select portions of teachings within [the Maier] reference and combine them, e.g., select various substituents from a list of alternatives" (MPEP§ 2131.02, citing, *Ex Parte A*). The Board held that anticipation can only be found if the classes of substituents are sufficiently limited or well delineated and such is not the instant case in Maier. It must be noted that Maier lists 37 different possible elements in the specification that can be included as metal oxides in the Maier composition. Additionally, claim 3 specifically recites that *up to 50% by weight of said mixed-metal oxides consists of one or more metal oxides* chosen from a group consisting of *33* of the 37 elements listed in the specification. Because one or more of these 33 elements can be included in the Maier catalyst, the number of combinations is staggering. This is because the number of possible non-repeating combinations (subsets) of any group equals $2^{n}-1$, where "n" is the number of members in a set. Therefore, there are a total of $2^{33}-1$, or roughly 8.59 billion, possible combinations of the second group of metal oxides recited by claim 3 of the Maier reference. But the Maier reference doesn't stop there. This huge number of combinations must also be multiplied by 15 (i.e., $2^{4}-1$), which is the possible number of combinations of the first Maier group of one or more of the 4 named oxides, namely, of one or more of titanium, silicon, alumina or zirconium as well, bringing the possible combination of mixed metals in the Maier invention up to roughly **128 billion**. It is respectfully submitted that a list of 128 billion possible combinations cannot be considered "sufficiently limited or well delineated."

Additionally, it is submitted that the principles set forth in *In re Petering* (as cited by the MPEP), also apply. In *Petering* the CCPA held that, where a generic formula encompasses a

vast number and perhaps even an infinite number of compounds, it cannot be found to anticipate a single compound which falls within this group absent additional teachings to choose the elements at issue (wherein the specific compound at issues was included in listed preferred substituents which limited the generic class to about 20 compounds). It is submitted that the Maier reference does not teach or suggest the actual recited metal oxide combinations recited in the instant invention. In fact, it should be noted that the Maier specification includes 33 different "Examples," (potentially including "preferred constituents" or "preferred embodiments"), none of which include the combination of metal oxides specifically recited in the instant claims. Therefore, it is submitted that the specific metal oxide combinations recited in the instant case are not anticipated by the roughly 128 billion combinations disclosed by the Maier reference.

Additionally, the Examiner is also respectfully referred to the holding in In re Ruschig, (343 F.2d 965, 145 U.S.P.Q. 274 (C.C.P.A. 1965), wherein a prior art reference that claimed a group of 259 compounds was found not to anticipate claims to four specific compounds of that group where the prior art did not specifically describe the latter four compounds.

Lastly, it is submitted that not only does the Maier reference not teach or suggest the instant invention's mixed-metal oxide layer combination as recited in claim 1, but it is respectfully submitted that the broad ranges set forth by Maier in no manner teach or suggest the specific recited mass ratios 1.0: 0.5: 0.5, of tin oxide to zirconium oxide, to the third metal oxide. In fact, it is respectfully submitted that the Maier reference teaches away from this ratio since, as quoted by the Examiner, the Maier reference recites *"at least 50% of said mixed oxides consists of one or a mixture of oxides of titanium, silicon, alumina or* zirconium," (emphasis added) which, it is respectfully submitted, makes the possibility of the recited mass ratio even more remote in the Maier invention, since the recited mass ratio in claim 1 of the current invention recites the mass ratio of tin oxide to be twice that of zirconium oxide.

Therefore, in brief, because the Maier reference does not describe the mixed-metal oxide combination recited by the instant invention, nor does it teach or suggest the recited mass ratio 1.0: 0.5: 0.5, nor does Maier teach or suggest that such a metal oxide combination or ratio is

desirable or preferred, but instead Maier provides a staggering number of possible metal oxide combinations, it is submitted that the Maier reference does not describe the instant invention as required by 35 U.S.C. 102(b), thus the Maier reference does not anticipate the current invention as recited in claim 1. Claim 1 is therefore believed to be in condition for allowance. Because claims 3 and 5-11 depend from what is believed to be an allowable base claim, claim 1, they too are believed to be in condition for allowance.

As to independent claim 17, this claim recites:

17. A low-temperature oxidation-reduction catalyst comprising:
a noble metal selected from the group consisting of platinum, palladium, gold, silver and rhodium;
a mixed-metal oxide layer comprising:
a first metal oxide which possesses more than one stable oxidation state consisting of tin oxide;
a second metal oxide consisting of zirconium oxide; and
a third metal oxide selected from the group consisting of cerium oxide, hafnium oxide, lanthanum oxide, and ruthenium oxide;
said first, second and third metal oxide each being an active catalytic component of said mixed-metal oxide layer; and
wherein said noble metal is from about 1 to about 50 weight percent, based on the total weight of the catalyst; and the first, second and third metal oxide are collectively from about 50 to about 99 weight percent, based on the total weight of the catalyst.

It is respectfully submitted that contrary to the Examiner's assertion, the Maier reference does not anticipate the mixed metal oxide layer recited in claim17, for the same reasons as explained above in reference to claim 1. Additionally, claim 17 is believed to even further distinguish over the Maier reference in that claim 17 specifically recites "said first, second and third metal oxide each being an active catalytic component of said mixed-metal oxide layer." The Maier reference states:

The preparation and composition of these materials can be stated briefly as follows:

$$x(RO)_4Si+y(R'Si(OR^1)_3)+z(X)_nM+H_2O\rightarrow(R'-SiO_{1.5})_x(MO_{n/2})_zSiO_2)_y+4xROH+3yR^1OH+nHX$$

where R and R' are suitable alkyl or aryl groups which may be the same or different, R' is the non-hydrolyzable organic group which changes the hydrophilicity of the material, and M is an element of the group consisting of Si, Ti, Al, Mo, Sn, Zn, V, Mn, Fe, Co, Ni,

> As, Pb, Sb, Bi, Ru, Re, Cr, W, Nb, Hf, La, Ce, Gd, Ga, In, Tl, Ag, Cu, Li, K, Na, Be, Mg, Ca, Sr and Ba and mostly represents the carrier of the catalytic activity....The base material in this example is SiO_2 which may be replaced by Al_2O_3, TiO_2 or ZrO_2,..." (Maier, column 2, lines 46-64, emphasis added.)

It is respectfully submitted that not only doesn't the Maier reference teach the recited mixed metal oxide layer recited in claim 17 (for the reasons explained above as to claim 1), but it also does not teach the use of the recited first, second and third metal oxides as being active catalytic components, thus even further distinguishing claim 17.

In light of the above, independent claim 17 is believed to fully distinguish from the Maier reference and is therefore believed to be in condition for allowance. Because claims 18-25 depend from claim 17, they too are believed to be in condition for allowance as well.

Based on the above, reconsideration and withdrawal of the present rejection is respectfully requested.

Art Made of Record

The prior art made of record and not applied has been reviewed and Applicants are in agreement with the Examiner that the prior art of record and not applied does not defeat the patentability of the present invention.

CONCLUSION

It is submitted that the Applicants have submitted new and unique Stabilized Tin-Oxide-Based Oxidation/Reduction Catalysts. In view of the above, it is submitted that the double patenting rejection is now moot and Claims 1, 3, 5-11, and 17-25 are in condition for allowance. Therefore, it is requested that a Notice of Allowance be issued at an early date.

Respectfully submitted,

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